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A NEW GENUS AND SPECIES OF ENTEDONINAE (HYMENOPTERA: EULOPHIDAE) FROM NORTH AND CENTRAL AMERICA

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Abstract.—A new genus and species of the subfamily Entedoninae (Hymenoptera: Eulophidae), ***Callifrons maculata*** Schauff, Yoshimoto, and Hansson are described based on specimens from Costa Rica, Mexico, and the United States (Florida and Missouri). *Callifrons* is differentiated from other entedonine genera by the expansion of the upper vertex and frons into two distinct points laterad of the eyes and is considered most closely related to *Closterocerus* and *Omphale*. The host is unknown.

Key Words: Chalcidoidea, North America, Central America, Eulophidae, *Callifrons*

Introduction: Over the past few years, a major effort has been underway by a group of American, Canadian, and European chalcid workers to prepare a comprehensive set of keys to the genera of Chalcidoidea for the U.S. and Canada. As part of that work a number of new taxa are being described in most of the major families of chalcids so that the keys will be as up to date as possible.

This paper describes a new genus of the subfamily Entedoninae (Eulophidae), making a name available so that the group can be included in the forthcoming key to eulophid genera that will be a part of the larger keys to the genera of the superfamily.

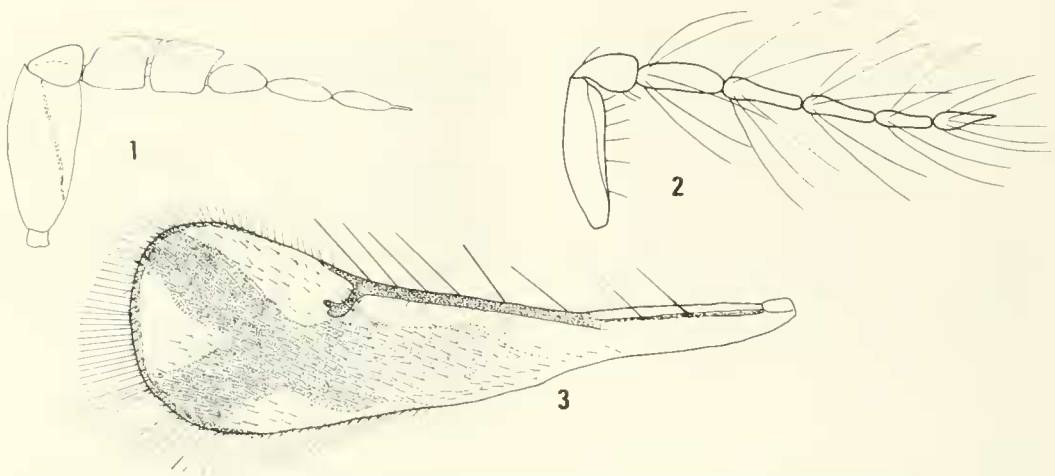
Museum abbreviations used in the text are as follows: CNCI; Canadian National Collection of Insects, Agriculture Canada, Ottawa; BMNH, The Natural History Museum, London; USNM, National Museum of Natural History, Washington, D.C.; LUZM, Lund University Zoological Museum, Lund, Sweden; UCR, University of California, Riverside.

Callifrons Schauff, Yoshimoto, and Hansson, NEW GENUS

(Figs. 1–8)

Type species: *Callifrons maculata* Schauff, Yoshimoto, and Hansson, new species.

Description: Female antenna (Figs. 1, 6) with 5 flagellar segments, not obviously divided into funicle and club; head (Fig. 7) trapezoidal in side view, vertex and upper frons (Fig. 8) flattened, about as wide as long laterally, anterolateral margins expanded into two points forward of front edge of eye (Fig. 8); occiput sharply margined behind ocelli; scrobal grooves short, U-shaped, intersecting transverse frontal groove; ocelli present, arranged in equilateral triangle; antenna inserted high on head, distance to edge of vertex only about ½ distance to oral fossa; malar suture present, weakly delineated; clypeus visible, about as high as wide; mandible 3-dentate. Pronotum short, visible dorsally only as a narrow strip behind the

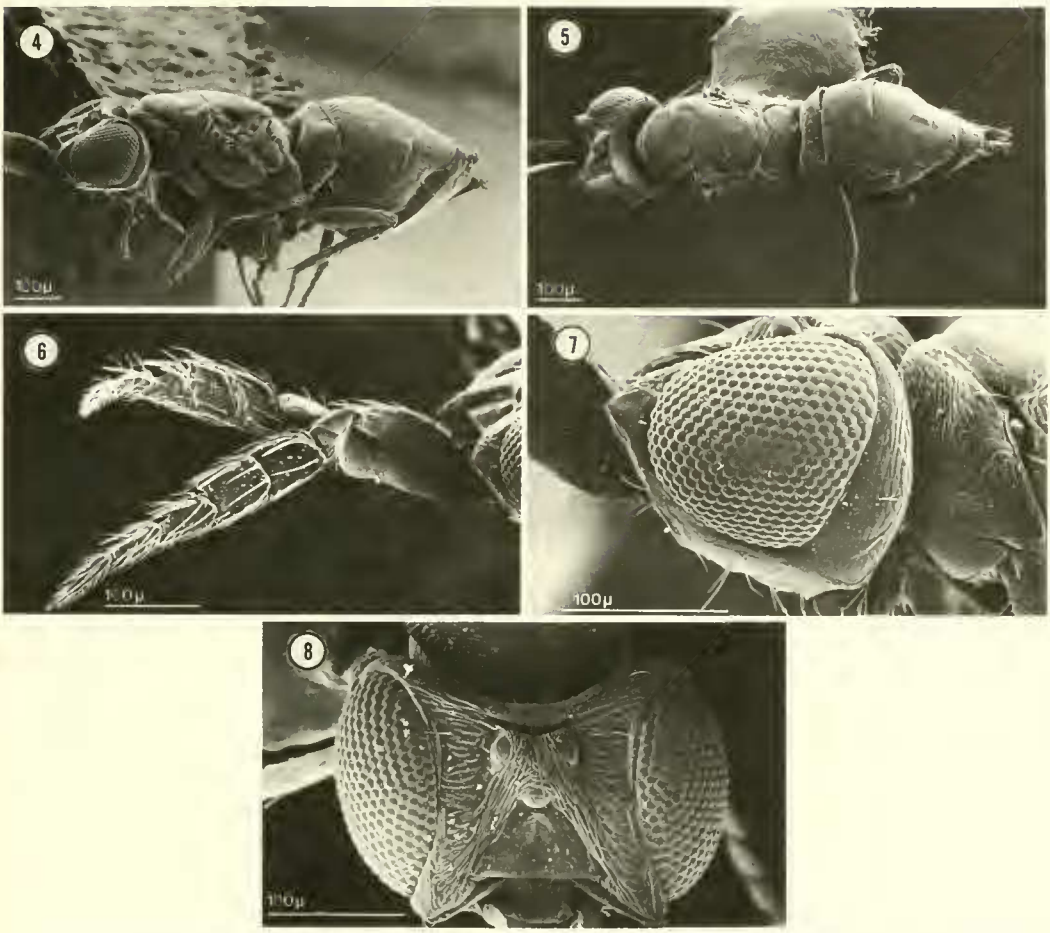


Figs. 1–3. *Callifrons maculata*. 1, Female antenna. 2, Male antenna. 3, Female forewing.

head (Fig. 5); mesoscutum with notauli incomplete, visible only anteriorly, setae reduced to a single small pair at posterolateral margin; axilla slightly advanced forward of scuto-scutellar suture; prepectus with posterior margin uninterrupted; scutellum with single pair of minute setae; propodeum without median or submedian carinae, area laterad of spiracles raised above the plane of the rest of the propodeum; petiolar foramen large, rounded, nearly contiguous with hindcoxal foramen; hindcoxal foramen large, ovoid; petiole reduced dorsally to a narrow strip, barely visible from above; ovipositor sheaths barely produced past tip of metasoma; forewing (Fig. 3) with submarginal vein slightly shorter than marginal vein; stigmal vein about equal in length to postmarginal vein.

Discussion: This genus is defined by the large, flattened vertex which is nearly as long as wide and is on a plane parallel with the dorsal thorax, with the anterolateral edges produced forward of the eyes and the slightly raised ocellar triangle. As far as we are aware, this character is unique among entedonines. *Piekna nitens* Boucek (1988), from New Guinea, approaches this condition, having a somewhat triangular head in side view, but the vertex is sloped and the scrobal grooves are Y-shaped. In addition, the toruli are situated farther from the vertex in *Piekna*. Some species of *Closterocerus, Omphale,* and rarely *Chrysocharis,* also have a somewhat triangular or trapezoidal head, but they also have the vertex sloping continuously and while the scrobal grooves are generally U-shaped, the frontal grooves are in the form of an inverted V. The antennae also resemble *Closterocerus*, with the scape expanded and at least some of the funiculars expanded and flattened. However, given the variability of antennal form, we hesitate to give this character much weight above the species level.

In the revision of holarctic genera of Entedoninae by Schauff (1991), this genus would key to couplet 6 based on the clypeus separated from the rest of the face by a suture. From couplet 6, it would probably key to *Holcopelte,* because the posterior medial margin of the vertex is somewhat sharply defined; however, the shorter petiole and apparent absence of notauli would conflict with the characters for *Holcopelte.* Likewise, the characters of the taxa in couplet 7 (*Eugerium* and *Omphale*) would also conflict. If the clypeus character was misinterpreted because of the light color of that area of the face, then the genus would key to



Figs. 4–8. Scanning Electron Micrographs of female *C. maculata*. 4, Lateral view of body. 5, Dorsal view of body. 6, Female antenna. 7, Lateral view of head. 8, Dorsal view of head.

Closterocerus. In addition to the characters of the head which define this new genus, *Callifrons* can be separated from *Closterocerus* by the sculpturing of the dorsal thorax (generally sculptured in *Closterocerus*, smooth in *Callifrons*) and the banding of the forewings (bands transverse in *Closterocerus* [*C. tau* Girault with both horizontal and lateral bands] and longitudinally along the wing in *Callifrons*).

Plotting characters to the estimate of relationships presented by Schauff (1991), *Callifrons* is most closely related to *Closterocerus* or *Omphale*. These two genera share a common ancestor at stem 18 (see Schauff 1991, pg. 89). The well-defined clypeus would indicate a closer relationship with *Omphale*, while the form of the female antenna would argue for closer relationship to *Closterocerus*. The form of the female antenna in *Closterocerus* is variable and the flattening of the scape and anterior funiculars is reduced in some species. While the head is somewhat triangularly shaped in some species of *Closterocerus* as well, this too shows considerable variation. Likewise, while coloration of the forewings (usually in the form of transverse stripes) is present in several species of *Closterocerus* and is generally not present in *Omphale*, this char-

acter is also highly variable. Long whorls of setae on the antenna of the male are found in some species of *Omphale*, but are not generally present in *Closterocerus*. Finally, the dark-brown body color (mixed with light colors) is generally more similar to the condition found in *Omphale* in which many species are yellow or brown, than to *Closterocerus*, species of which are almost always metallic colored. Body color, however, is not generally reliable as a generic character and we do not give it much weight.

Overall, it would seem that the bulk of the characters argue for a relationship between *Closterocerus* and *Omphale* + *Eugerium*, with closer affinity to *Omphale*.

Etymology: Calli (meaning beauty or beautiful) and frons, referring to the oddly-shaped head of this species. Gender feminine.

Callifrons maculata
Schauff, Yoshimoto, and Hansson, New Species
(Figs. 1–8)

Description: Female: Length: 0.8 to 1.2 mm. Dark brown with metallic greenish reflections, except the following: fourth flagellar segment (penultimate antennomere) white, vertex white between eye margin and ocellar triangle, frons with transverse white stripe above the toruli and second white stripe that begins between the toruli and descends along the eye margin to the genae, area around clypeus also white; mid and hindcoxae brown, hindfemur pale brown (slightly infuscated), rest of legs white to pale yellow.

Head: antennae with scape flattened, only 2.2× as long as broad at broadest point (Figs. 1, 6), flagellar segments 1 and 2 also flattened and slightly longer than broad, segments 3–5 cylindrical and longer than wide, each successively smaller than previous segment, sensilla basiconica erect, slightly angled (type 3, Hansson 1990); vertex imbricate (Fig. 8), slightly angled downward between anterior prominences and anterior ocellus to frontal groove, with a single conspicuous seta arising from ocellar triangle between lateral ocelli; face and frons smooth, area between toruli raised, mandible 3-dentate.

Mesosoma (Figs. 4, 5): pronotum weakly imbricate, mesoscutum smooth except weakly imbricate at anterior margin, with a single pair of minute setae posterolaterally; scutellum and axilla smooth, axilla reduced dorsally; propodeum smooth, about ½ length of scutellum, moderately arched medially, with single seta laterad of spiracle.

Metasoma: twice as long as wide, smooth.

Wings: forewing about 3× as long as wide (Fig 3), longest marginal seta about ⅓ width of wing at widest point, ratio of submarginal : marginal : postmarginal : stigmal 7.0: 10.0:1.5:1.5, marginal vein with 6 long strong setae, ventrally with 8–11 smaller setae, membrane of wing with longitudinal infuscation, setae denser in infuscated area. Hindwing narrow, pointed apically, lightly infuscated over most of surface.

Male: Mostly similar to the female except the following: length 0.6 to 0.9 mm. Body color generally a paler shade of brown than female.

Head: antenna (Fig. 2) with all segments brown to pale brown, scape 3.5× as long as wide, single anellus, 5 flagellar segments, all cylindrical and each with basal whorl of elongated setae (each seta about twice length of a segment); vertex with only a small whitish area adjacent to eye margin, flattened area reduced, sloping area between eye margins more pronounced and extending from near anterior eye margin on both sides, scrobal grooves shorter, torulus removed less than one diameter from frontal groove; metasoma about 2.8× as long as broad (42: 15); hindwing broadest at tip of venation, 10× as long as broad.

Forewing: infuscation reduced in intensity, but pattern still similar to female, longest marginal seta 0.8× as long as width of wing.

Variation: Variation in body length is given above. Infuscated area on the forewing of males may be reduced to no more than a small spot under the stigmal vein and a second larger spot at the end of the membrane. The pattern on the female forewings is consistent in the series available for study.

Types.—Holotype female: USA, MO, Wayne Co., Williamsville, VIII. 1987. J. T. Becker, MT [Malaise trap] (Deposited in CNCI, type no. 21744). Paratypes: 13 females and 5 males all with same data as holotype; other specimens from same locality but with different collection dates are: 4 females July, 1987; 2 females 10–26 June, 1987, 2 males October, 1987; 1 female, 1 male: USA, FL., Dade Co., Everglades National Park Pineland Forest, Long Pine Key, 31.VIII–9.XII, S. and J. Peck; 1 male: USA, FL., Alachua Co., Gainesville, AEI and Archer Road, 25.VII–18.VIII. 1987. BRC Hym. Team; 1 male: Mexico, Michoacan, 10 Km. N. Neuva Italia, 12 July 1981, J. LaSalle; 1 female: Mexico, Chiapas, 30 Km. SW Ocozocoautla, 30 June, 1981, J. LaSalle. 1 female, Costa Rica, Guanacaste, Santa Rosa, N.P., Hacienda-1-0. 18 October–8 November 1986, D. Janzen and I. Guald; 1 female Costa Rica, Guanacaste Province, Santa Rosa National Park, 26 Oct.–16 Nov. 1985. Malaise trap. D. Janzen. Deposited in CNC with paratypes deposited in USNM, BMNH, and LUZM, and UCR.

Distribution: Known from Missouri, Florida, Mexico, and Costa Rica.

Hosts: Unknown.

Discussion: This species is easily recognized by the patterning of the forewing, the oddly shaped head with anterior projections, and the striped color pattern of the face and frons.

Etymology: The species epithet refers to the darkened patterning of the forewing.

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LIFE HISTORY AND DESCRIPTION OF IMMATURE STAGES OF *PAROXYNA GENALIS* (THOMSON) (DIPTERA: TEPHRITIDAE) ON NATIVE ASTERACEAE IN SOUTHERN CALIFORNIA

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Abstract.—*Paroxyna genalis* (Thomson) is a multivoltine tephritid that develops in flower heads of a broad spectrum of Asteraceae in California. The egg, first through third-instar larvae, and puparium are described and figured for the first time. Distinctive morphological differences noted for these immature stages are in the sensilla comprising the lateral spiracular complexes of the meso- and metathorax and in the distribution and incidence of rugose pads on the anterior of the prothorax of the third instar larva. The larvae feed mainly on the ovules and soft achenes, but also may score the receptacle and imbibe sap at fresh wounds in these structures. Pupariation occurs in the larval feeding chamber among fragments of scored achenes. Premating and mating behaviors are described, including a characteristic, uplifted-wing movement newly designated as "lofting." Mate-guarding behavior by males following copulation is reported, apparently the first example among Holarctic Tephritidae. The principal natural enemies of immature *P. genalis* were the solitary, primary, larval-pupal, endoparasitic, chalcidoid Hymenoptera, *Eurytoma* sp. (Eurytomidae) and *Pteromalus* sp. (Pteromalidae).

Key Words: Insecta, *Paroxyna genalis*, nonfrugivorous Tephritidae, mating behavior, immature stages, Asteraceae, flower-head feeding

Twenty-one species of *Paroxyna* are known from North America north of Mexico (Novak 1974, Foote et al. 1993), but only the life history and immature stages of *P. albiceps* (Loew), a common species in the northeastern United States, have been described in detail (Novak and Foote 1968). This paper describes the life history and immature stages of a second Nearctic species, *P. genalis* (Thomson), the most commonly encountered *Paroxyna* in California (Goeden 1994) and an adopted natural enemy of the alien weed, tansy ragwort, *Senecio jacobaea* L. (Frick 1964).

MATERIALS AND METHODS

Locating field populations of *P. genalis* reasonably accessible from Riverside allowed us to complete this study principally on *Eriophyllum lanatum* (Thomson) and *Senecio mohavensis* Gray, two of its many recently reported host plants (Goeden 1994). Field observations primarily were made on *E. lanatum* at a study site located in a gently sloping, dry clearing among conifers at 2030-m elevation in the National Children's Forest, San Bernardino National Forest (northern section), San Bernardino Co., during 1990–92. Flower heads containing eggs, larvae, and puparia were sampled at this and additional locations on this and other host-plant species reported below and elsewhere (Goeden 1994). *Senecio mohavensis* was sampled weekly during February and March, 1993, at 260-m elevation in Box Canyon, Riverside Co., in the Col-